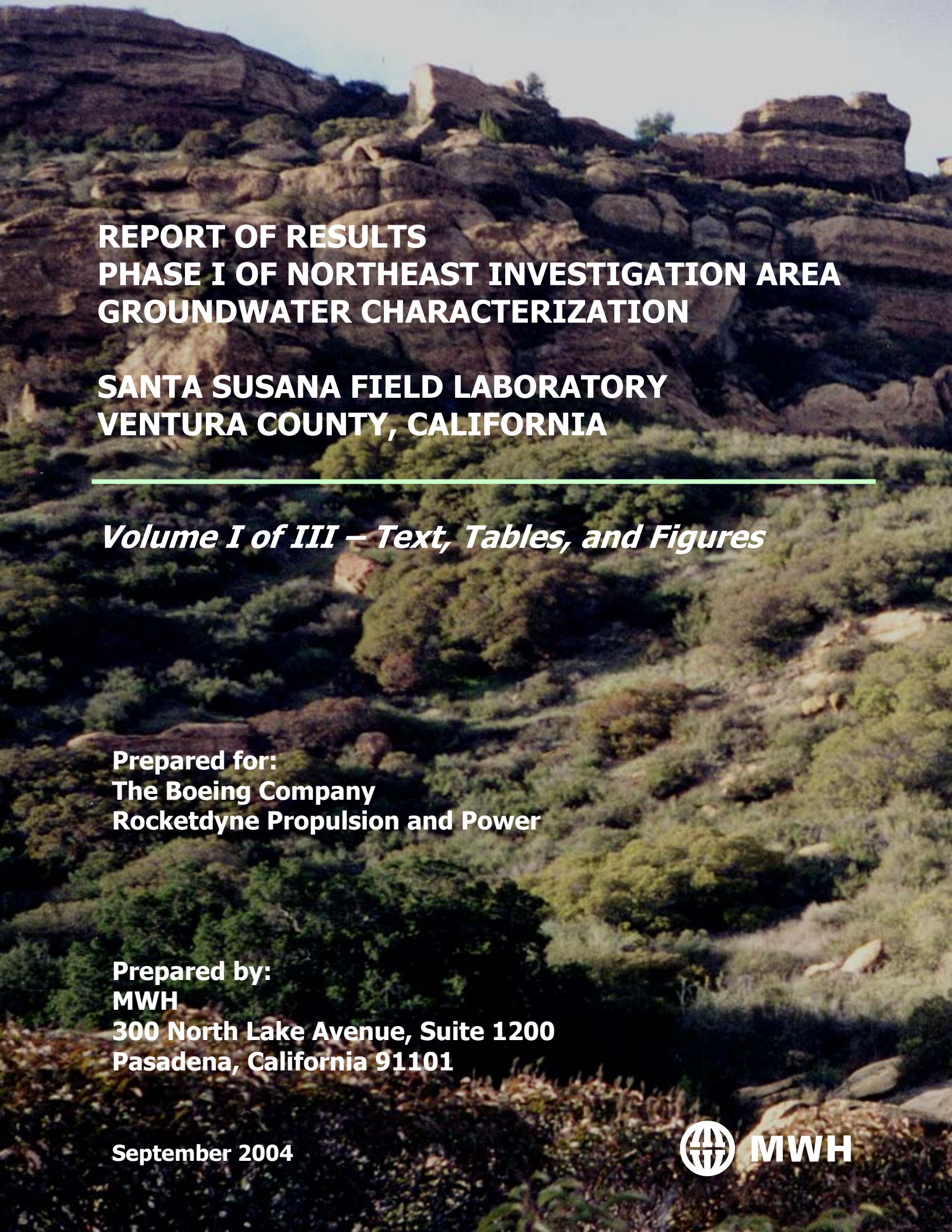

REPORT OF RESULTS
PHASE I OF NORTHEAST INVESTIGATION AREA GROUNDWATER CHARACTERIZATION

SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

Volume I of III – Text, Tables, and Figures

Prepared for:
The Boeing Company
Rocketdyne Propulsion and Power

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September 2004

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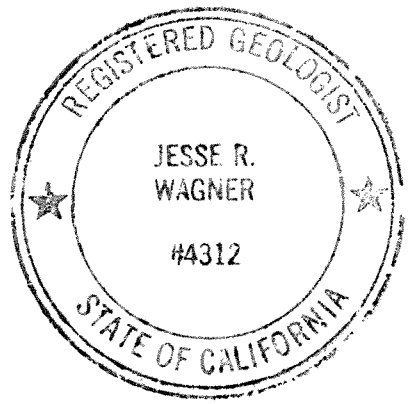

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TABLE OF CONTENTS

Volume I of III

TABLE OF CONTENTS (Continued)

APPENDICES

Volume II of III

Appendix A RFI Site History, Chemical Use and Nature and Extent of COPCs

Volume III of III

Appendix B Background Information on Groundwater Characterization and Monitoring

Appendix C Description of Work Performed

Appendix D Additional Descriptions of Physical Site Characteristics

Appendix E Supporting Documentation on Groundwater

Appendix F Borehole Geophysical Montages (electronic copy saved on compact disk)

Appendix G Slug and Connectivity Tests (portable document format saved on compact disk)

Appendix H Synopsis: Rock Core VOC Results for Coreholes C-1 through C-7 (portable document format saved on compact disk)

Appendix I Hydrographs (portable document format saved on compact disk)

Appendix J Data Validation Report, June 2002 Sampling Event of Multi-level Monitoring Systems

Appendix K Results of C-1 Pumping Test

Appendix L Summary Report of Results for the C-1 Pumping Test, Temporary Authorization for Treatment of Corehole C-1 Effluent at the WS-5 Treatment System

Appendix M Graphs of Chemical Concentrations in Groundwater versus Time and Groundwater Elevations (portable document format saved on compact disk)

PLEASE NOTE: The original version of this report includes colorized features and shading. A black and white copy of this report should not be used because it may not accurately represent the information presented.

LIST OF ABBREVIATIONS

AOCs	areas of concern
APTF	Advanced Propulsion Test Facility
AST	Above ground storage tank
Boeing	The Boeing Company
bgs	below ground surface
CFOU	Chatsworth Formation Operable Unit
CMR	combinable magnetic resonance
cm/s	centimeters per second
cm/sec	centimeters per second
COPCs	chemicals of potential concern
CTL	Component Test Laboratory
DCA	dichloroethane
DCE	dichloroethene
DOE	United States Department of Energy
DTSC	Department of Toxic Substances Control
DQO	Data Quality Objectives
ELV	Expendable Launch Vehicle
EPA	U.S. Environmental Protection Agency
FSDF	Former Sodium Disposal Facility
ft^3/ft^3	cubic feet per cubic feet
g	grams
g/cc	grams per cubic centimeter
gpm	gallons per minute
GW	groundwater
^1H	protium
^2H	deuterium
IEL	Instrument and Equipment Laboratory
in/yr	inches per year
KLC	Lower Chatsworth formation
KUCB	Bowl member of the Upper Chatsworth formation

LIST OF ABBREVIATIONS
(Continued)

KUCC	Canyon member of the Upper Chatsworth formation
KUCH	Happy Valley member of the Upper Chatsworth formation
KUCS	Sage Member of the Upper Chatsworth formation
KUCW	Woolsey Canyon member of the Upper Chatsworth formation
LETF	Laser Engineering Test Facility
mD	millidarcies
mg/L	milligrams per liter
msl	mean sea level
NASA	National Aeronautics and Space Administration
NE	Northeast
NPDES	National Pollutant Discharge Elimination System
^{16}O	oxygen-16 isotope
^{18}O	oxygen-18 isotope
OU	Operable Unit
PZ	piezometer
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAIC	Science Applications International Corporation
SCM	site conceptual model
SSFL	Santa Susana Field Laboratory
SWMUs	solid waste management units
TCA	trichloroethane
TCE	trichloroethene
USGS	United States Geologic Survey
µg/L	micrograms per liter
$\mu g/L_v$	micrograms per liter vapor
VOCs	volatile organic compounds
δ	delta

1.0 INTRODUCTION

This report presents groundwater characterization results of any site- and activity-related chemical impacts to the groundwater in the northeast investigation area of the Santa Susana Field Laboratory (SSFL). The SSFL is jointly owned by The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA) and is operated by Boeing. A portion of the SSFL that is owned by Boeing was leased to the U.S. Department of Energy (DOE). The SSFL is located in the southeast corner of Ventura County, 29 miles northwest of downtown Los Angeles, California. The location of the SSFL and its surrounding vicinity is shown on Figure 1-1.

The work described in this report was performed as outlined in the *Work Plan for Additional Field Investigations, Chatsworth Formation Operable Unit* (CFOU Work Plan) (Montgomery Watson, 2000b) and as outlined in the *Shallow Groundwater Investigation Work Plan*[1] (Ogden, 2000). The California Environmental Protection Agency, Department of Toxic Substances Control approved the work plans for implementation (DTSC, 2000a and 2000b). Work performed on the near-surface groundwater in the northeast and throughout the SSFL is provided in the *Near-Surface Groundwater Characterization Report* (MWH, 2003e).

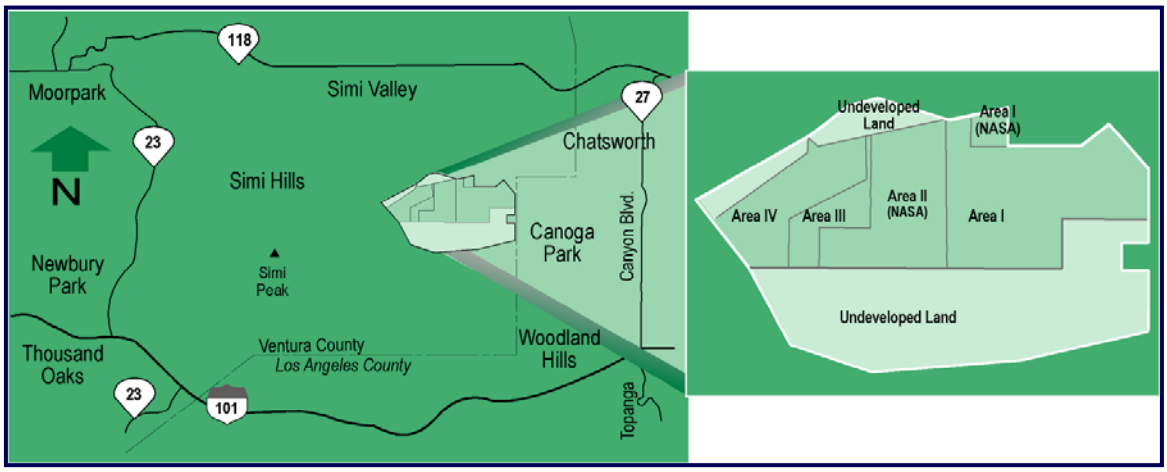

Figure 1-1. SSFL Site Location Map
The Santa Susana Field Laboratory is located in the Simi Hills. The city of Simi Valley lies about two miles to the north of the SSFL and the San Fernando Valley lies about two miles to the east-southeast. The SSFL is divided into four administrative areas (I through IV). Boeing owns the land in Areas I, III and IV. The National Aeronautics and Space Administration owns the land in Area II and a small parcel of land in Area I. The US Department of Energy leased a portion of the land in Area IV from Boeing. Boeing operates all the facilities on Areas I through IV. Areas I through III have been used primarily for rocket engine and related component testing. Area IV has been used primarily for nuclear reactor research and is currently undergoing decommissioning and demolition.

[1] The near-surface groundwater underlying the SSFL has been defined as groundwater that occurs in alluvial or colluvial deposits and/or weathered bedrock. The near-surface groundwater system has been coupled with investigations of the unsaturated alluvial or colluvial deposits and/or weathered bedrock and these have collectively been defined as the Surficial Media Operable Unit (Surficial OU). The Surficial OU also contains other environmental media that include air, biota, surface water and pond sediments. Chatsworth formation groundwater has been defined as groundwater that occurs in unweathered bedrock beneath the SSFL. References to "groundwater" in this report will, by definition, include both the near-surface and Chatsworth formation groundwater.

The portion of the SSFL that is discussed in this characterization report is located in the northeast section of the SSFL, as shown on Figure 1-2. The northeast investigation area is one of six areas where site-related impacts to groundwater are currently being characterized. Most of the former or current operational facilities lie within these six investigation areas.

Previous subsurface environmental investigations have shown that groundwater underlying the SSFL has been impacted primarily by historic releases of volatile organic compounds (VOCs), with trichloroethene (TCE) being the compound detected at the highest relative concentration and with the most frequency. Other chemicals of potential concern (COPCs) are present in groundwater beneath the SSFL that can likely be attributed to historical operations. However, these COPCs are present at lower relative concentrations and at fewer locations.

1.1 Purpose

The CFOU work plan (Montgomery Watson, 2000b) provided a description of work to be performed to complete the first of two phases of field investigations for Chatsworth formation groundwater at the SSFL (i.e., Phase I). The purpose of this report is to present the results of data collected during the Phase I investigation.

This report is being prepared in partial fulfillment of the requirement to characterize groundwater that has been established in the corrective action provisions of the post-closure operating permit for Areas I and III (Areas owned and operated by Boeing [see Figure 1-1 for boundaries] Permit No. PC-94/95-3-02) and the November 12, 1992 Stipulated Enforcement Order (DTSC, 1992).

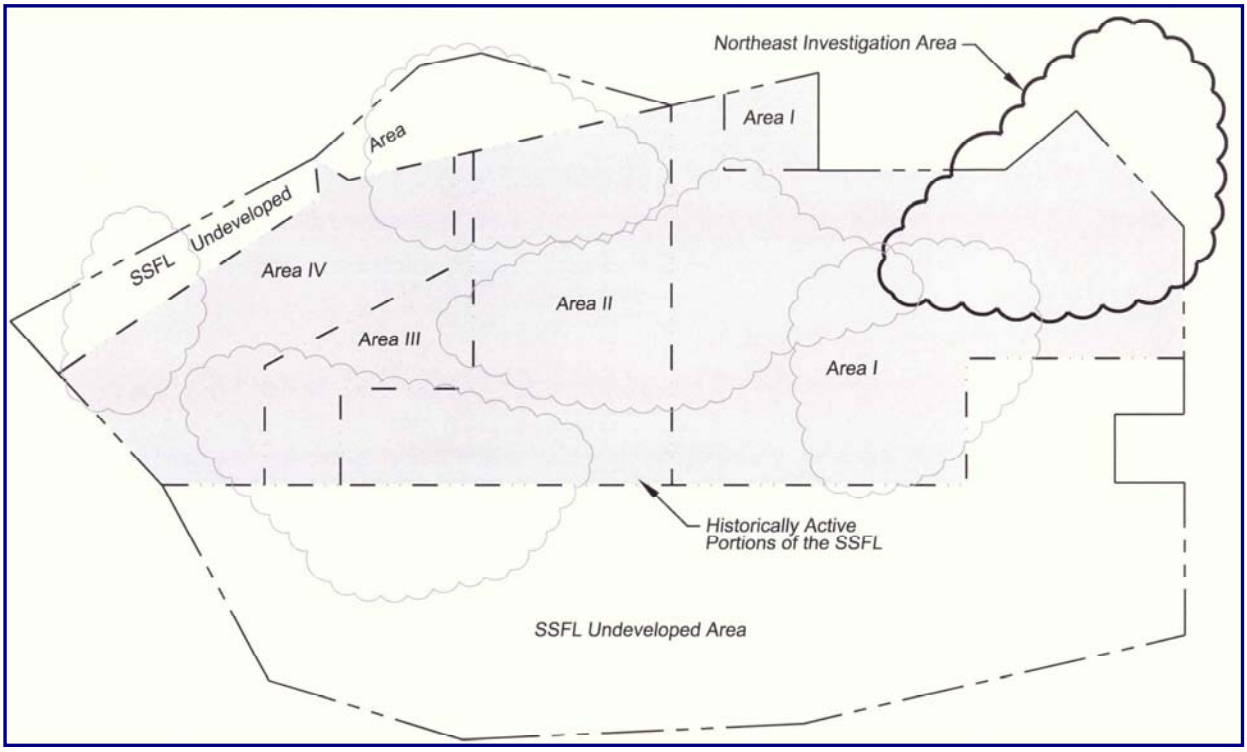

Figure 1-2 SSFL Map Showing NE Investigation Area Study Boundary
This report describes groundwater characterization work that has been performed in the northeast portion of the SSFL. This area is one of six areas throughout the SSFL where groundwater characterization activities are underway. The other five areas are also shown within the light gray boundaries. Most of the current or former operational areas at the SSFL lie within the six investigation areas.

1.2 Report Organization

The first volume of this report is a summary overview of important elements of the work that has been performed to characterize groundwater in the northeast investigation area. Details of the work are provided in appendices contained in subsequent volumes. As such, this summary overview contains the following sections:

Section 2 provides background information on operational usage and the historical development of groundwater characterization work in the northeast, an overview of the site conceptual model (SCM) for groundwater and the approach taken in the work plan to characterize groundwater and evaluate the site conceptual model.

Section 3 summarizes groundwater characterization activities that have been performed since 2000.

Section 4 provides data on the physical characteristics of the northeast investigation area as related to groundwater characterization.

Section 5 provides information on groundwater occurrence and other hydrogeologic characteristics.

Section 6 provides information on solvent usage at the SSFL, describes the sampling of various environmental media for the characterization of VOCs and presents the nature and extent of TCE in soil, soil vapor, bedrock and groundwater. The same material is presented for all other COPCs in the northeast in an appendix to this report.

Section 7 provides a summary and conclusions on the groundwater characterization in the northeast and reviews the data collected within the context of the groundwater SCM.

Section 8 provides references cited in this report.

WHERE TO FIND MORE INFORMATION:
You may review the documents at these locations:

California State University, Northridge
Attn: Robert Marshall (818) 677-2832
Urban Archives Center
Oviatt Library, Room 265 (West Wing)
18111 Nordhoff Sreet
Northridge, CA 91330-8329

Simi Valley Library
Attn: Dale Redfield (805) 526-1735
2969 Tapo Canyon Road
Simi Valley, CA 93063

Los Angeles Public Library – Platt Branch
Attn: Janet Metzler (818) 340-9386
23600 Victory Hills Blvd
Woodland Hills, CA 91367

DTSC Regional Records Office
Attn: Jone Barrio (818) 551-2886
1011 N. Grandview Avenue
Glendale, CA 91201